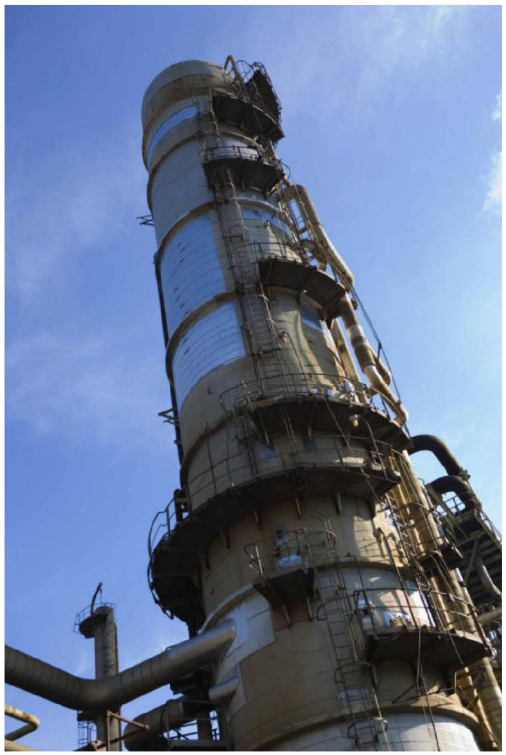
Ammonia SCC



Senior Analyst and Inspector Training
Crude Units

Ammonia Stress Corrosion Cracking (SCC)

Characteristics

- Requires stress (applied or residual), water, oxygen, ammonia, and a susceptible material — A pH above 8.0 can accelerate SCC and makes corrosion more likely
- Brass exchanger tubes are susceptible, especially at roll areas and U-bends, where stresses can be high
- In crude units, process side SCC has occurred in admiralty tubes in the atmospheric and vacuum overhead systems
- Blue-colored corrosion products indicate ammonia corrosion and possible SCC

Ammonia Stress Corrosion Cracking (SCC) (Cont'd)

Prevention

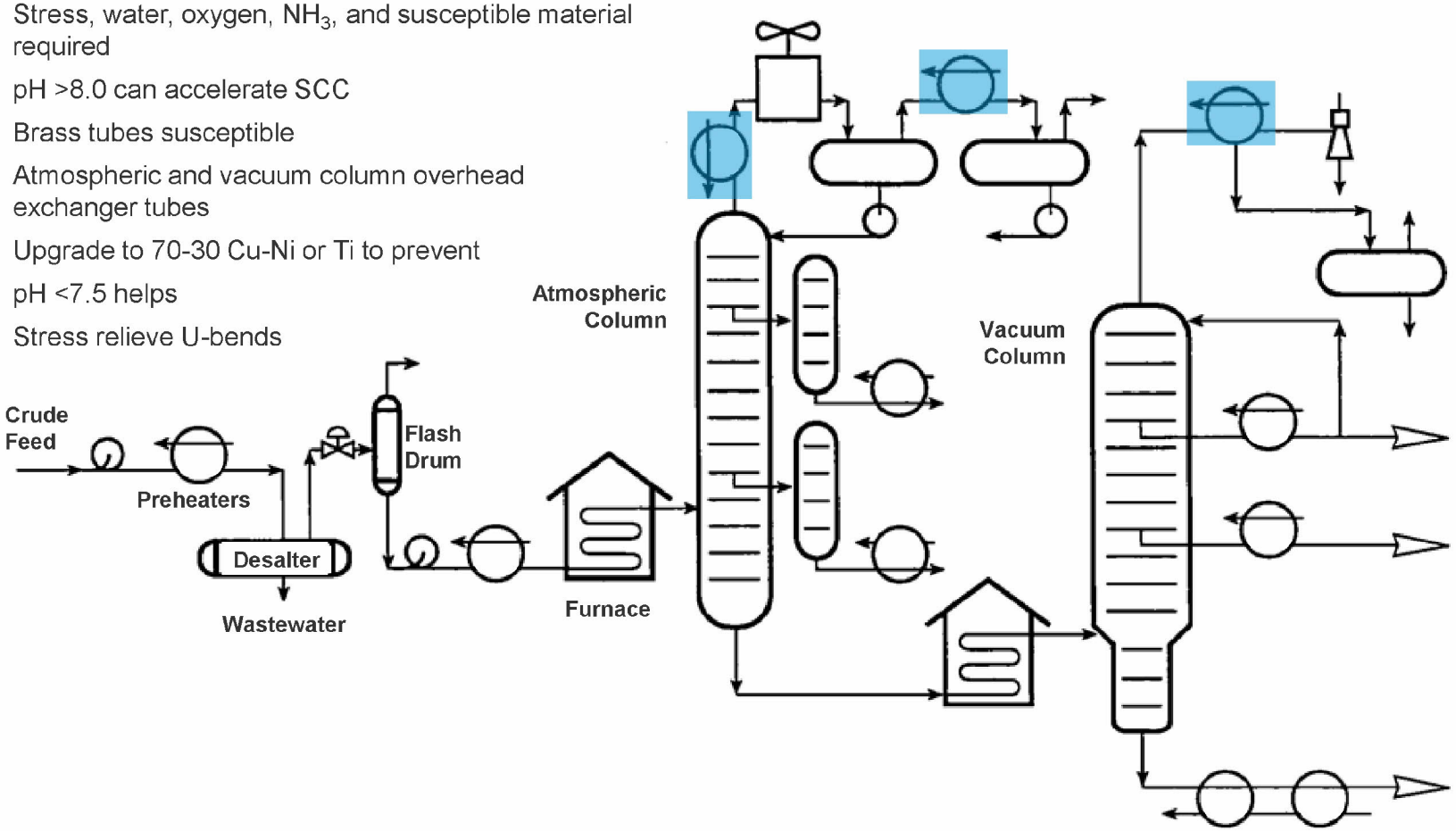
- Upgrade to 70 Cu-30 Ni or titanium
- Reduce stress:
  - Stress relieve U-bends
  - Handle brass bundles carefully during shutdowns
- Minimize oxygen entry into the vacuum overhead system
- Keep overhead pH below 7.5 — best practice says 7.0-7.5

Inspection

- See Inspection Strategy IS-11 (API 571 Damage Mechanism #48)

Typical Areas in Crude Units Susceptible to Ammonia SCC

- Stress, water, oxygen, NH_3, and susceptible material required
- pH >8.0 can accelerate SCC
- Brass tubes susceptible
- Atmospheric and vacuum column overhead exchanger tubes
- Upgrade to 70-30 Cu-Ni or Ti to prevent
- pH <7.5 helps
- Stress relieve U-bends



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